

1 467 828

- (21) Application No. 13656/74 (22) Filed 27 March 1974  
(31) Convention Application No.  
2 318 914 (32) Filed 14 April 1973 in  
(33) Fed. Rép. of Germany (DT)  
(44) Complete Specification published 23 March 1977  
(51) INT. CL.<sup>8</sup> A61M 17/02  
(52) Index at acceptance  
A5T 505 513

(19)



## (54) RESPIRATOR MASK

(71) I, ASMUND SIGURD LAERDAL, a Citizen of Norway, of Stavanger, Norway, do hereby declare the invention for which I pray that a patent may be granted to me, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a respirator mask and more especially to a disposable respirator mask.

According to the present invention there is provided a respirator mask comprising a central dome shaped portion and a soft deformable rim attached to the edge of the central portion for contact with the face of a person, an air inlet tube being connected to said central portion, the central portion including an area or areas of reduced thickness surrounding and adjacent the inlet tube whereby the central portion may be pressed inwardly of the rim by pressure on said inlet tube.

In a preferred embodiment the rim can be manufactured very cheaply for instance by the blowing technique for the manufacture of hollow plastics bodies which is in itself known, particularly if a moulding tool is employed here in which several rims can be manufactured in a single blowing step. Such a moulding tool, is for example described in the Swiss Patent Specification No. 442,710. For the manufacture of the mask rim plastics customary for processing by the blowing process, for example, polyethylene and polyvinyl chloride, can be employed.

The present mask can be of such low manufacturing cost that the manufacture of respirator masks for single use appears economically justifiable. There is a demand for such masks in hospitals, above all for anaesthetic purposes. However, there is also the possibility of replacing only the contact rim in such (anaesthesia) masks, which requires an exchangeable fix-

ture of the rim to the central part in general consisting of hard plastics. For this purpose, for example, a groove can be provided on the rim which may receive a bead on the central part, by means of which the two parts can be detachably joined to each other. After such a mask has been used, the contact rim is thrown away and the centre part is cleaned or disinfected.

The rim, which may be of other moulded plastics, may be permanently sealed from the atmosphere and filled with gas.

The present mask is constructed in such a way that it can be stored in a space-saving manner. However, where the rim is an inflated rim care must be taken that normally it is not possible to exert such a pressure from outside on the contact rim in the package (the internal pressure in the rim may be slightly greater than the external pressure) that the rim bursts or that air is gradually forced out of the rim through the wall of the film which, to a certain, though only small extent, is air permeable.

According to a preferred feature of the invention the inlet tube is such as is so arranged that it can be pressed inwardly in such a manner that the free end thereof will protrude beyond said rim to protect the rim. Thus the air inlet tube of the mask may be located at a centre part of the mask in such a way that it can be pressed in and that, after pressing in, it still protrudes a little, on both sides, beyond the contact rim, with its free end and with its end connected to the central part of the mask. By pressing in the air inlet tube, the central part of the mask which, with the mask in working condition, domes considerably and therefore also requires a relatively large space, obtains a space-saving flat form, the central part being pushed down into the space surrounded by the contact rim. In the compressed state, the mask

can therefore very easily be stored in First Aid Packs. In the compressed state of the mask, the inlet tube may protrude beyond the contact rim with both its ends and optionally also with the wall part of the central part of the mask immediately next to its end; this ensures that the rim cannot be subjected to excessive pressure when a pressure is exerted on the package from above or below. The pressure is absorbed by the aforementioned protruding parts and kept away from the contact rim. To make it possible to press in the central part of the mask or the air inlet tube, weakened zones are provided during formation of the central part of the mask by reducing the thickness of material at the central part of the mask around the tube.

In order to achieve a very simple and hence also cheap fixing of the ribbons or cording of the head-strapping to the mask, clamping members may be provided at the latter for pulling through and fixing the means of fastening, with infinite adjustability. For this purpose, the clamping members can possess two elastic walls arranged at a distance from each other, between which the ribbons or cords can be pulled and clamped tightly.

Illustrative embodiments of the invention will now be described with reference to the accompanying drawings, in which:—

Figure 1 shows a perspective view of one form of mask;

Figure 2 shows the mask of Figure 1 in a folded condition for storage;

Figure 3 shows a section taken along the line III-III of Figure 1;

Figures 4 to 6 show sections through the rims of various masks illustrating preferred features of the invention, and

Figure 7 shows a view of a mask in which clamping parts for the pulling through and the fixing, with infinite adjustability, of the cords of the head-strapping are provided, this being a preferred feature in masks of the invention.

Referring to the drawings, there are shown masks which comprise a contact rim 1, constructed from a plastics blow-moulding having an interior space 2 which is filled with air and tightly and permanently isolated from the outside. The rim 1 can be firmly connected, for example, by gluing, to the central part of the mask, designated as 3. It is however, also possible to fasten the rim to the central part of the mask in a detachable manner, as shown in Figures 4 to 6. For this purpose, in Fig. 4, a groove 4 is moulded into the rim 1 and the edge of the central part of the mask is provided with a moulded bead 5 which can be firmly pressed into the groove 4, when the parts 1 and 3 are pressed against each other. In Figure 5, a

rib 10 is moulded on the rim 1 and can snap into a groove 11 formed at the edge of the central part 3. To receive the rim 1 in the edge of the central part 3 of the mask, the edge has a moulded recess 12 into which the rim 1 can be slid and clamped, engagement between the rib 10 and the groove 11 providing additional securing of the central part. In Figure 6, a groove 13 is formed on the rim 1 by an extension 15, in which groove the edge of the central part 3 can be clamped tightly.

In the working condition, the central part 3 of the mask extends outwardly from the rim 1, and moreover has an air inlet tube 6 which points centrally outwards from the central part of the mask, thereby resulting in a relatively large space requirement for storing the mask.

In order to reduce the space requirement substantially in the non-working condition of the mask, the embodiment shown in Figures 1 to 3 is provided with a tube 6 which can be pressed into the mask, with the central part of the mask turning inwards (see Figure 2). This is made possible by the thickness of the wall part 7 of the central part of the mask immediately adjacent to the tube 6 being substantially smaller than that of the remaining wall parts and preferably also, and as shown, the thickness of the wall part immediately adjacent the rim 2 is of similar smaller thickness. By the reduction in wall thickness of the wall part 7, a flexing zone is created here which makes it possible to press in the tube 6 and turn the central part 3 of the mask inwards in spite of a relatively rigid construction of the central portion 3.

As can be seen in Figure 2, after it has been pressed into the mask, the tube 6 protrudes with its ends above and below the contact rim 1, whereby the latter is protected against too strong a compression if a pressure is exerted on the upper and/or lower side of the compressed mask. On one side (at the bottom in Figure 2), the protruding wall part 7 also forms a counter bearing for a pressure acting on the mask. The correct measure of pressing in, for the bearing action of the two ends of the tube 6, can be achieved by the design of the extent of the reduction zone 7.

In the mask shown in Figure 7, in which a zone or zones of reduced thickness are not illustrated, a T-shaped clamping member 9, preferably of plastics, is provided at the central part 3 on its outer side, that is to say the side away from the face, e.g. by being moulded on. The cords 14 of the head-strapping can be pulled through between elastic flaps 9' and 9'' of a clamping member 9 and the wall of the central part 3 of the mask and are thereby secured

5 tightly in any position. As a result, an  
infinitely variable adjustment of the cords  
14 and hence an entirely individual adapta-  
tion of the head-strapping to the individual  
5 conditions of each case is possible. The  
T-shaped form proves suitable for the  
reason that the ends of the cords 14 can  
thereby be bent back and fixed so that they  
do not cause interference in front of the  
10 central part of the mask. Of course, the  
clamping members can also take another  
form, for example, they can be made U-  
shaped. In any case, the clamping action  
arises from the inherent elasticity of the  
15 flaps of the clamping member.

WHAT I CLAIM IS:—

1. A respirator mask comprising a cen-  
tral dome-shaped portion and a soft deform-  
able rim attached to the edge of the central  
20 portion for contact with the face of a per-  
son, an air inlet tube being connected to  
said central portion, the central portion  
including an area or areas of reduced thick-  
ness surrounding and adjacent the inlet  
25 tube whereby the central portion may be  
pressed inwardly of the rim by pressure on  
said inlet tube.

2. A mask according to claim 1 wherein  
the central portion includes a further area  
30 of reduced thickness closely adjacent the  
rim.

3. A mask according to claim 1 or 2,  
in which the interior of the rim is per-  
manently sealed from the atmosphere and  
35 filled with gas.

4. A mask according to claim 1, 2 or 3

in which the rim is of blow-moulded  
plastics.

5. A mask according to any preceding  
claim in which the air inlet tube is such  
40 and is so arranged that it can be pressed  
inwardly in such a manner that the free  
end thereof will protrude beyond said rim  
to protect the rim.

6. A mask according to any preceding 45  
claim, in which clamping members are pro-  
vided for receiving cord or ribbon by which  
the mask may be secured to the head of a  
person.

7. A mask according to claim 6, in which 50  
the clamping members are located on the  
exterior of the central portion.

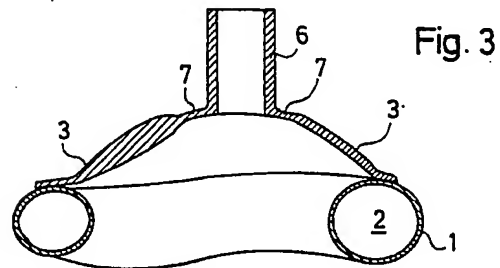
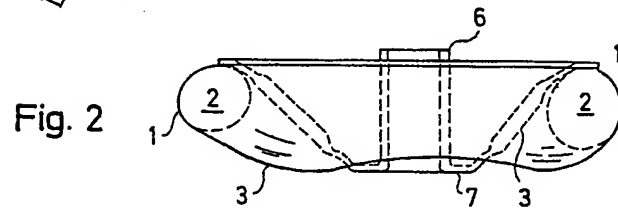
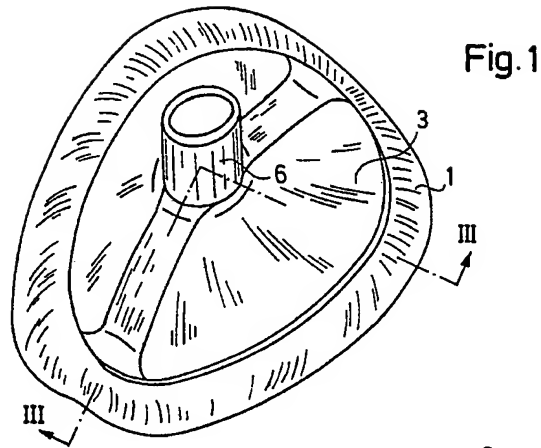
8. A mask according to claim 6 or 7 in  
which the clamping members are in the  
form of moulded T-shaped members. 55

9. A mask according to any preceding  
claim in which the rim is detachably  
secured to the central portion of the mask.

10. A respirator mask constructed and  
arranged substantially as described herein 60  
with reference to and as shown by Figures  
1 to 3, of the accompanying drawings.

11. A respirator mask according to claim  
10 modified substantially as hereinbefore  
described with reference to and as illu- 65  
strated in Figure 4, Figure 5 or Figure 6  
of the accompanying drawings.

J. A. KEMP & CO.,  
Chartered Patent Agents,  
14 South Square,  
Gray's Inn,  
London WC1R 5EU.



1467828

COMPLETE SPECIFICATION

4 SHEETS

*This drawing is a reproduction of  
the Original on a reduced scale*  
Sheet 2

Fig. 4

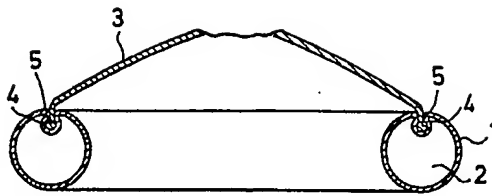


Fig. 5

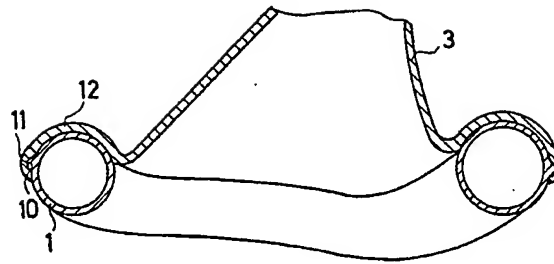


Fig. 6

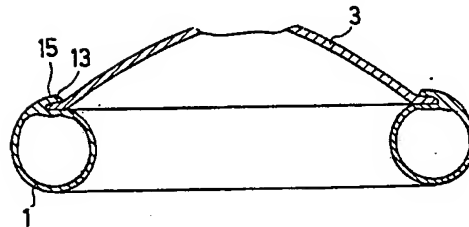
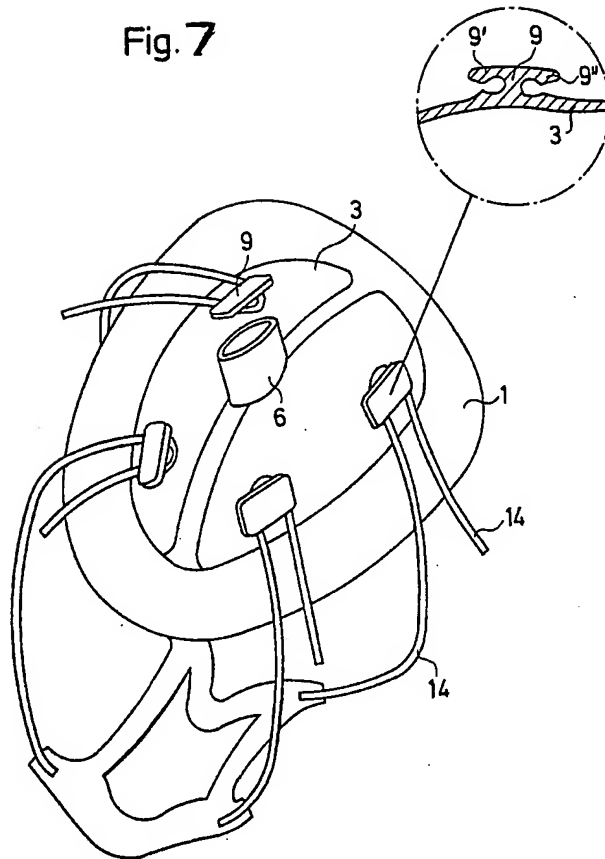


Fig. 7



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☒ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**